Borate Glasses and Their Response to Temperature and Pressure

Invited Talk

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Borate Glasses and Their Response to Temperature and Pressure

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Borate glasses continue to be of significant scientific interest, especially in the development of structural models and rationalization of structure/property relationships. These glasses are well known for substantial structural changes in response to different thermal histories, especially in terms of the boron coordination number. In this work, we study the impact of high temperature compression on the structure and properties of a variety of boron-containing glasses, ranging from simple borates to more complex borosilicate and aluminoborate glasses. The application of pressure at temperatures around Tg enables permanent densification of the glasses, and sizes of the resulting glass pieces are amenable to a variety of characterization approaches. Compression leads to changes in bulk density and short-range structure involving cation coordination, but the structural response to densification is also manifested in alteration of the environment and concentration of superstructural units, a key characteristic of borate glasses. The impact of compression on both structure and glass properties will be described.